Claims:

SUB A2 >

1. A method for growing oxide thin films, c h a r a c t e r i z e d in that the films are produced by the ALE process by using as the precursor cyclopentadienyl compounds of strontium and/or barium, together with one or more volatile titanium compounds and a reactive oxygen precursor.

2. The method according to Claim 1, c h a r a c t e r i z e d in that the oxide thin film to be grown is dielectric.

3. The method according to Claim 1 or 2, c h a r a c t e r i z e d in that there are 1-10, preferably 1-2, similar growth cycles in succession, one growth cycle being made up of the feeding of a Ba compound, Sr compound or volatile titanium compound; an inert purge; the feeding of a precursor for oxygen; and a second inert purge.

4. The method according to any of Claims 1 - 3, c h a r a c t e r i z e d in that the cycle ratio of the alkaline earth metal compound and the titanium compound is 0.8-1.2.

5. The method according to any of Claims 1 - 4, c h a r a c t e r i z e d in that the volatile titanium compound is a titanium halide, titanium alkoxide, titanium nitrate ($Ti(NO_3)_4$), an alkylamino complex of titanium, a cyclopentadienyl complex of titanium, a silylamido complex of titanium, titanium dialkyldithiocarbamate, or titanium-β-diketonate.

6. The method according to any of the preceding claims, c h a r a c t e r i z e d in that the film growth substrate is a platinum (Pt), RuO_2, IrO_2, $SrRuO_3$, $LaSrCoO_3$, IrO_2/Ir, RuO_2/Pt, silica (SiO_2), silicon nitride or silicon surface.

7. The method according to any of the preceding claims, c h a r a c t e r i z e d in that the reactive oxygen precursor used is oxygen (O_2), water vapor, hydrogen peroxide or an aqueous solution of hydrogen peroxide, and/or ozone.

8. The method according to any of the preceding claims, c h a r a c t e r i z e d in that the formula of the precursor is $M(Cp)_2$ or $M(Cp)_2L_n$, where

- M is Sr or Ba,

- Cp is a fused or single cyclopentadienyl group of the form $Cp'R_mH_{5-m}$, where
  - m is an integer 0-5 and
  - R is a hydrocarbon group, the hydrocarbon groups being mutually either the same or different,
- the Cp groups are either the same or different,
- L_n is a neutral adduct ligand which binds to the metal by one or several of its atoms.

9. The method according to any of Claims 1 - 7, c h a r a c t e r i z e d in that

- the precursor for Sr and/or Ba is of the form M(Cp)X or $M(Cp)XL_n$, where
- M is Sr or Ba,
- Cp is a fused or single cyclopentadienyl group $Cp'R_mH_{5-m}$, where
  - m is an integer 0-5 and
  - R is a hydrocarbon group, the R's being mutually either the same or different,
- X is a ligand, other than Cp, having a valence of -1 and
- L is a neutral adduct ligand which binds to the metal by one or several of its atoms.

10. The method according to Claim 8 or 9, c h a r a c t e r i z e d in that the cyclopentadienyl group is cyclopentadienyl, pentamethylcyclopentadienyl, triisopropylcyclopentadienyl, indenyl, or fluorenyl.

11. The method according to Claim 8 or 9, c h a r a c t e r i z e d in that the Cp groups are contained in the same molecule.

12. The method according to Claim 11, c h a r a c t e r i z e d in that the bridge between two Cp groups is made up of a substituted or unsubstituted C_1 - C_6 carbon chain.

13. The method according to Claim 12, c h a r a c t e r i z e d in that the carbon chain forming the bridge contains a heteroatom, which is silicon, nitrogen, phosphorus, selenium, or sulfur.

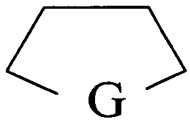
14. The method according to Claim 8 or 9, c h a r a c t e r i z e d in that R is a substituted or unsubstituted, cyclic, linear or branched alkyl, alkenyl, aryl, alkylaryl, arylalkyl, alkoxy, thio, amino, cyano or silyl group.

15. The method according to Claim 8 or 9, c h a r a c t e r i z e d in that the neutral adduct ligand L is

(i) a hydrocarbon,
(ii) an oxygen-containing hydrocarbon,
(iii) a nitrogen-containing hydrocarbon,
(iv) a sulfur-containing hydrocarbon,
(v) a phosphorus-containing hydrocarbon,
(vi) an arsenic-containing hydrocarbon,
(vii) a selenium-containing hydrocarbon, and/or
(viii)a tellurium-containing hydrocarbon.

16. The method according to Claim 8 or 9, c h a r a c t e r i z e d in that L is

(a) an amine or polyamine,
(b) a bipyridine,
(c) a ligand depicted by the formula



(V)

in which formula G is -O-, -S-, or -NR^1-, where R^1 is hydrogen or a substituted or unsubstituted, cyclic, linear or branched, alkyl, alkenyl, aryl, alkylaryl, arylalkyl, alkoxy, thio, cyano or silyl group, and in each carbon atom of the ring according the formula there is an R^1-like substituent, which are either mutually the same or different,

(d) ether, or
(e) thioether.

17. The method according to Claim 8 or 9, wherein L is an ether, polyether, amine, polyamine, bipyridine or tetrahydrofuran.

18. The method according to Claim 9, c h a r a c t e r i z e d in that X is a β-ketonate or a corresponding sulfur or nitrogen compound, alkyl, halide, amide, alkoxide, carboxylate or Schiff base.

19. The method according to any of the preceding claims, c h a r a c t e r i z e d in that the growth of the film takes place at 250-300 °C, and the postannealing carried out after the growth takes place at a temperature higher than the deposition temperature, preferably at 500 °C.

End A_2

ADD A_3

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